APPENDIX T

COASTAL ENGINEERING ASSESSMENT
PRC-421 REMNANT STRUCTURE REMOVAL

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PRC-421 REMNANT STRUCTURE REMOVAL

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1. INTRODUCTION

This report presents the results of a focused coastal engineering assessment to estimate the potential long-term oceanographic impacts associated with the construction of the proposed PRC-421 submerged hardbottom substrate feature[1]. Approximately 12,000 tons (10,900 metric tons) of quarry stone will be placed on the existing bottom to form a flat crested mound that will be approximately 170 feet (52 meters) in diameter and extend 9 feet (2.7 meters) above the existing bottom. The quarry stone placement is intended to form a protective cover around and over the toppled caissons and the bases of the four piles supporting the proposed roosting/nesting platforms, and provide habitat enhancement benefits.

This coastal engineering study was performed for Padre Associates, Inc. to furnish supplemental technical information to facilitate further evaluation of the project's proposed hardbottom substrate feature improvement. The specific focus of this study was directed toward review and assessment of the following three questions related to local coastal processes:

1. assess the potential for impacts to the nearshore wave climate;

2. assess the potential for impacts to the nearshore currents; and

3. assess the potential for impacts to the alongshore and cross-shore sediment transport processes.

2. EXISTING CONDITIONS

The PRC-421 remnant structure is located within the central portion of the Santa Barbara Channel along a stretch of shoreline locally known as Ellwood. The site is about 2 miles (3.2 kilometers) west of Coal Oil Point adjacent to the Sandpiper Golf

[1] See Section 3.1.3, Modeled Scenarios.

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Course as shown in Figure 1. The existing remnant structure and proposed hardbottom substrate feature site are approximately 850 feet (260 meters) offshore. Existing water depth varies from 32 to 34 feet (9.8 to 10.4 meters) below Mean Lower Low Water (MLLW) datum, and recent surveys indicate that the site is surrounded by rock outcrop and thick kelp (Fugro West, Inc, 2001).

2.1 Coastal Setting

The Ellwood shoreline is characterized by narrow sandy beaches that are backed by high coastal bluffs and offshore rock reef. Onshore, thin lenses of sand overlay deposits of cobble and bedrock substrate. Dry beach berm width along this stretch of coastline is ephemeral in that the beaches experience cyclical fluctuations of retreat and recovery in response to episodes of cross-shore sand movement and variable pulses of sediment that move downcoast by alongshore currents. In general, the shoreline is relatively stable as it has changed little over the past 70 years. Figure 2 shows an aerial photograph of the beach area near the PRC-421 site as recorded in 1929.

The coastal bluffs in the area are composed of light colored marine shale of the Monterey Formation overlain by unconsolidated terrace deposits from the Miocene and Pliocene geologic eras. The terrace deposits are estimated to consist of about 40 percent sand sized sediment. Studies by Diener (2000) have estimated that the bluffs within the study reach have receded about 60 feet (18 meters) over the past 50 years. This translates to an average annual retreat rate of 1.25 feet (0.38 meter) per year. This estimate does not allow for possible errors inherent in the methodology that was used to estimate the bluff recession.

2.2 Tides and Water Levels

Tides at Ellwood are of the mixed semi-diurnal type. Two high and two low waters of different magnitudes occur each day. The tidal characteristics of the site may be inferred from data collected at the Santa Barbara Harbor, located approximately 12 miles (19 kilometers) east of the project site. These data, summarized in Table 1, are based upon measurements recorded over a seven year period between 1991 to 1997.

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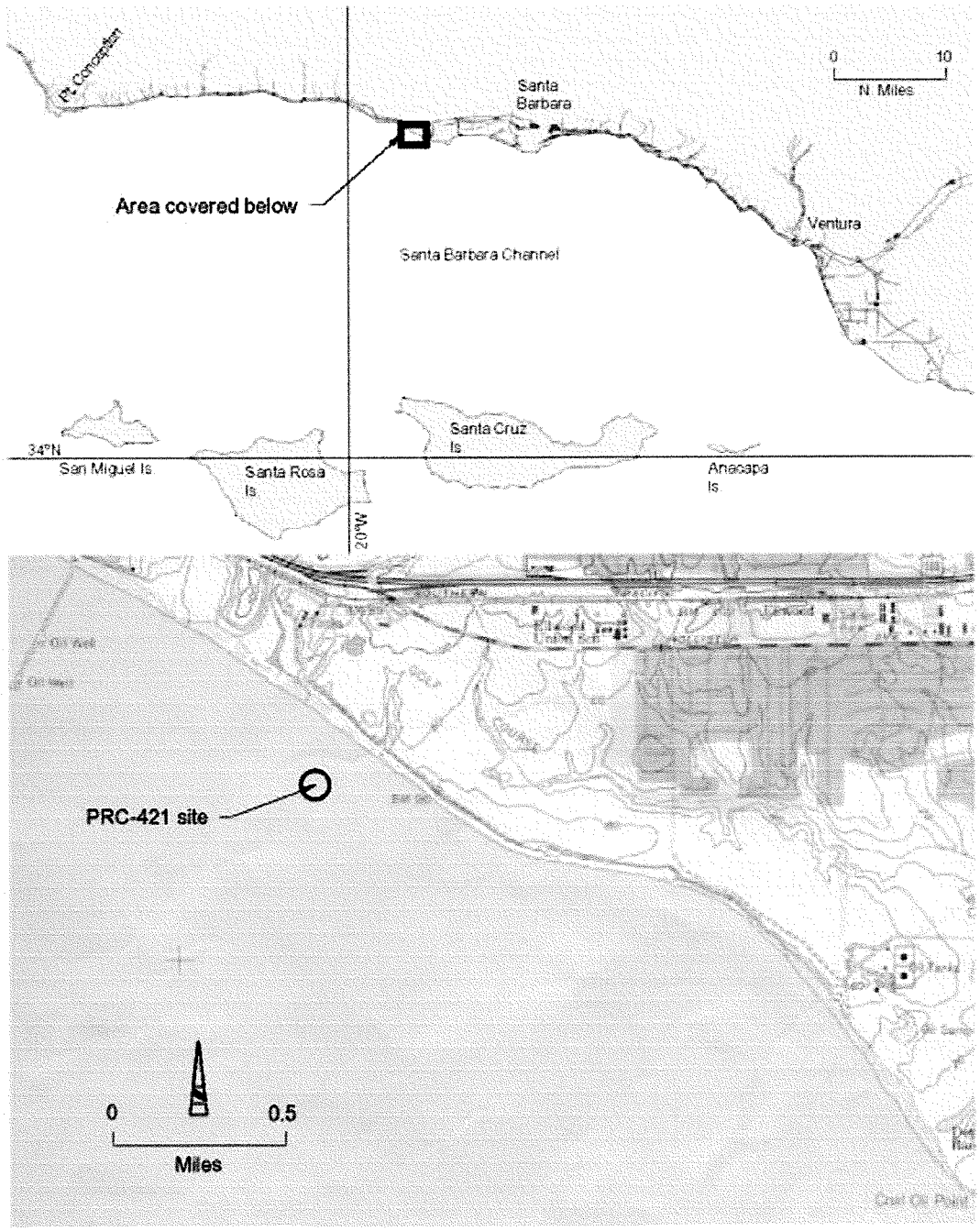

Figure 1. Project Location

Source: Portion of USGS quadrangle "Dos Pueblos Canyon, 1982 and NOS Chart 18720, 1987.

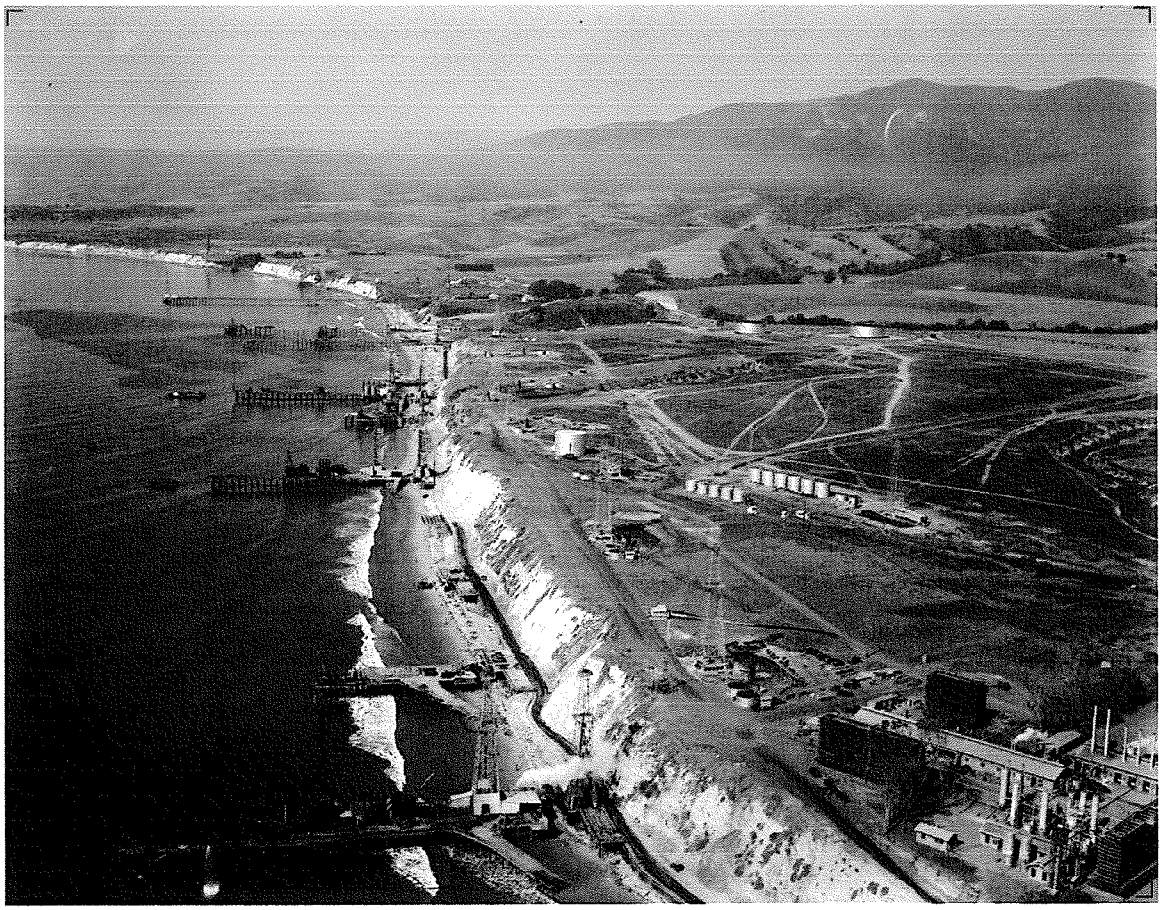

Figure 2. Ellwood shoreline in 1929 **Source: UCLA Department of Geography**

Table 2: Tidal Characteristics at Santa Barbara Harbor

Datum plane	Elevation, feet (meters) (1983 – 2001 tidal epoch)
Highest observed water level (1/19/92)	+7.4 (2.26)
Mean Higher High Water (MHHW)	+5.4 (1.65)
Mean High Water (MHW)	+4.6 (1.40)
Mean Tide Level (MTL)	+2.8 (0.85)
Mean Sea Level (MSL)	+2.8 (0.85)
Mean Low Water (MLW)	+1.0 (0.30)
Mean Lower Low Water (MLLW)	0.0 (0.00)
Lowest observed water level (12/17/33)	-2.9 (-0.88)

Source: http://tidesandcurrents.noaa.gov/benchmarks/9411340.html

Higher water levels will occur during periodic strong El Nino episodes. These meteorological anomalies are characterized by low atmospheric pressures and persistent onshore winds. Typically, El Nino Southern Oscillation (ENSO) events occur

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